



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

H.A

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/709,562

05/13/2004

Steven P. Barkyoub

BUR920040060US1

3561

30449

7590

10/11/2006

SCHMEISER, OLSEN & WATTS

22 CENTURY HILL DRIVE

SUITE 302

LATHAM, NY 12110

EXAMINER

NGUYEN, TUAN H

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 10/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/709,562

Applicant(s)

BARKYOUNB ET AL.

Examiner

Tuan H. Nguyen

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 11-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/15/06 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The newly amended claims 1-3 which recite the step of "determining if the process temperature is above a water condensation temperature of an ambient environment surrounding the deposition tool" is not supported by the instant specification.

This is a new matter rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Kobayashi et al. (cited US 6,562,219).

Kobayashi et al., figs. 1-2 and text on col. 2-8 teaches the claimed method for forming a seed layer 4 on a semiconductor substrate 2 including the steps of depositing a copper seed layer 4 on the semiconductor structure (col. 5, last two paragraphs); and raising the temperature (annealing) of the seed layer 4 above the water condensation temperature, 300-400⁰C (paragraph bridging col. 5-6), wherein the seed layer 4 has not been subjected to water vapor prior to raising the temperature of the seed layer 4.

See particularly col. 6, second paragraph which states: "the process up to the anneal chambers 13, which is to say the processes up to the formation of the first copper film 4 on the diffusion barrier film, are preferably carried out consecutively in a vacuum environment without exposing the substrate 19 to air (which inherently includes water vapor) during the treatment". This process is performed in a multi-chamber apparatus as shown in fig. 1.

With respect to claim 2, col. 6, lines 16-22 discloses an alternative annealing process wherein the vacuum is discontinued after forming the copper film 4 and the substrate is exposed to the air and the anneal is then carried out in an electric furnace.

With respect to claim 3, see col. 7, next to last paragraph for a further step of depositing a second copper layer 5.

With respect to claimed 5, see col. 5, lines 31-52 for the step of depositing a diffusion barrier layer 3.

With respect to claims 6, 7, col. 6, first paragraph discloses the delivery of Ar gas into the anneal chamber for annealing the seed layer 4.

Claims 1, 3-10 are rejected under 35 U.S.C. 102(e) as being anticipated by Pan et al. (cited US 2005/0054202).

Pan et al., figs. 1-3 discloses the claimed process for forming a seed layer 26 on a semiconductor structure including the steps removing moisture and oxygen by DEGAS/baking process in DEGAS chamber, the DEGAS chamber may be a conventional PVD chamber (paragraph [0020]-[0023]) before the steps of forming a diffusion barrier layer 22, and a copper seed layer 26 (paragraphs [0024]-[0025]) by PVD and /or CVD at temperature of about 250-450⁰C which is above the water condensation temperature.

With respect to claim 3, see paragraph [0028] for a further step of forming copper layer 28.

With respect to claims 6-10, Pan, paragraph [0020] teaches the use of sputtering tool that includes a chuck for carrying out the DEGAS and PVD process. The DEGAS/baking process uses an inert gas for raising the substrate temperature as disclosed in paragraph [0021].

Response to Arguments

Applicant's arguments filed 8/22/06 have been fully considered but they are not persuasive.

Since nowhere in the instant specification discloses the step of "determining if the process temperature is above a water condensation temperature of an ambient environment surrounding the deposition tool" as claimed in claim 1, this is considered as a new matter.

Contrary to the Applicant's argument in his Remarks, page 11, second paragraph that the new step of "determining" of claim 1 has support in the specification. The specification states in paragraph 0016, lines 5-9 that: "Before the structure 100 exists the vacuum environment of the sputter tool, the temperature of the structure 100 is raised (i.e., warm up) above the water condensation temperature of the factory environment". Nowhere in this statement, neither expressly nor implicitly supports the step of "determining" as is now claimed in claim 1. Note that raising the temperature of the structure above the water condensation temperature does not inherently imply that the determination must be made as to whether the process temperature is above the

Art Unit: 2813

water condensation temperature of the factory environment as alleged, as long as the process temperature of the structure is raised to the process temperature (usually in the range of 250-450⁰C) which is well above the water condensation temperature, it is inherently above the condensation temperature of the environment without the step of determining.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan H. Nguyen whose telephone number is 571-272-1694. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Tuan H. Nguyen

Tuan H. Nguyen
Primary Examiner